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The Citrus Industry

THE ONLY PUBLICATION IN THE WORLD
DEVOTED EXCLUSIVELY TO CITRUS FRUITS

Issued Monthly

Representative of every interest—
Representing no special interest

VOL. 2 TAMPA, FLA., MARCH, 1921 NO. 3

Insure Your Fruit Crop

Give Your Trees A Chance

to produce a profitable crop of fruit this season. Help them along by applying FICO SPRAYS to prevent the pests which drain their vitality. Such "insurance" means big dividends at picking time.

SCAB—RUST MITES—RED SPIDERS. Get them ALL with the same spray at the same time! LIME-SULPHUR SOLUTION will do the job for you in the most practical manner without damage to tender growth. Kills rust mites, red spiders, and young scales, prevents scab, and checks thrips.

WHITE FLY—SCALE. What FICO-60 does to these fellows is a caution! Easily mixed—easily applied—keeps indefinitely—and is EFFECTIVE. Known to growers as "The Reliable Spray." One application in May and you can forget these troubles until Fall.

Have you read the CITRUS LEAF? If not, write for your copy at once. It's free and you'll like it! Full of interesting, practical, commonsense suggestions. Should be in the hands of every grower. If it doesn't solve your particular problem, we'll be glad to do that by special letter.

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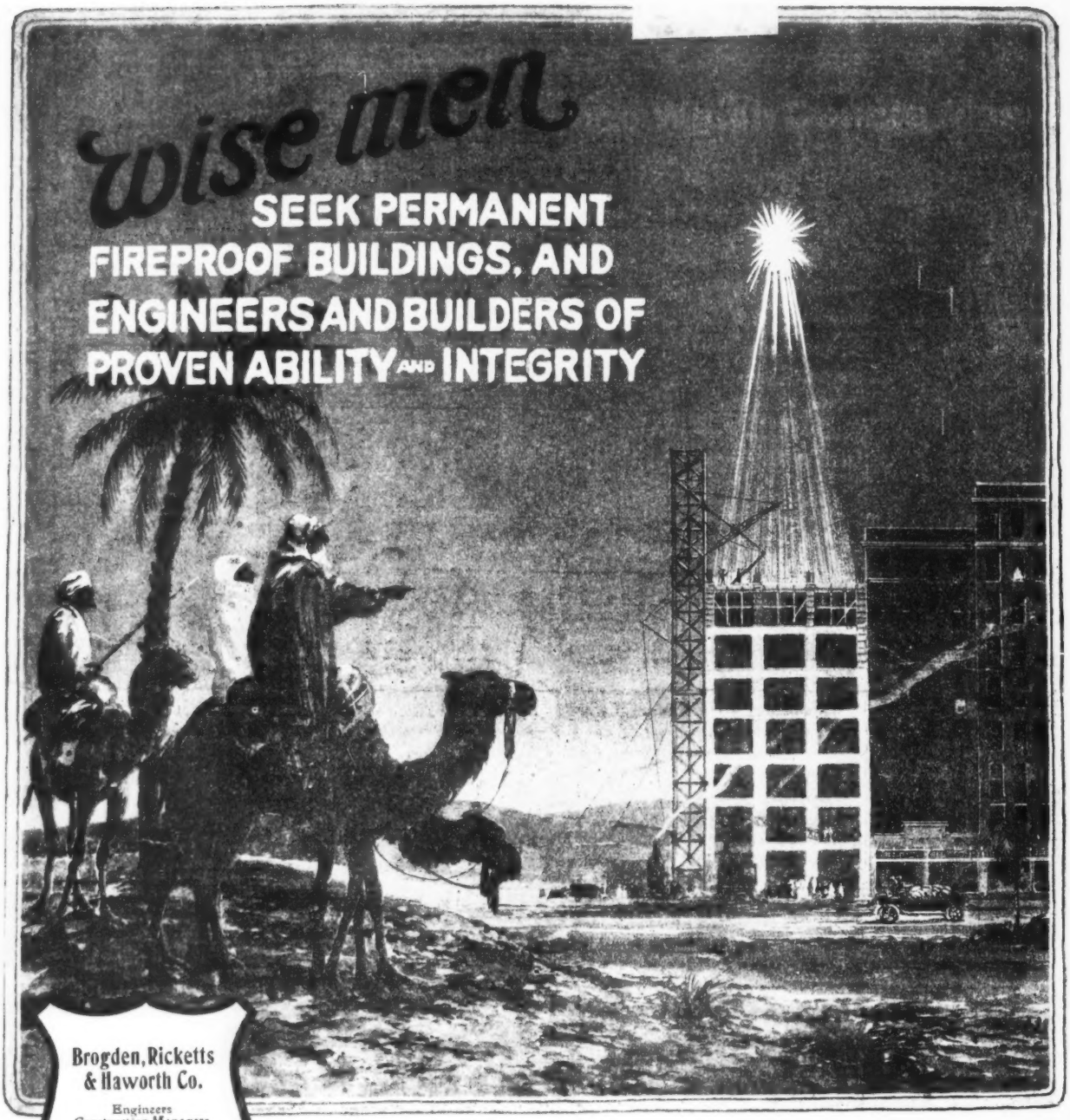

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Decay of Citrus fruits in Transit

By O. F. Berger

With most fruit it takes 51 weeks to produce a crop and one week to market it. In this one marketing week 51 times more care should be taken than in any one of the previous producing weeks. However, here is where many growers fail—they take less care in marketing their fruit than in growing it.

During the fall and winter of 1918-19 from 10 to 15 per cent of Florida fruit decayed on the way to market. This was a loss of at least 890,000 boxes of fruit. This decay was due largely to blue mold. It has been shown repeatedly that this decay is not caused by inherent weakness of the fruit, but by bad handling. During the war it was impossible to obtain good help, but that condition has been remedied and good labor can now be obtained. Scientific workers have proven that a wound in the fruit is necessary before blue mold fungus can enter.

The foreman of the picking crew is responsible for much of the decay. It is his business to see that each picker leaves no long stems or makes clipper cuts. He must also examine field boxes and see that all protruding nails and splinters are removed and sharp corners rounded. Care must be taken in emptying the fruit from the picking bags that the fruit is not injured. As far as results are concerned, every injured fruit is a rotten fruit.

In the packing house the fruit must not come in contact with sharp edges of machinery. Washers and bins must be so constructed that the fruit is not crowded or given violent

SENATOR PARK TRAMMELL
Who Would Put Tariff On Citrus Fruits

motion. The packers must wear gloves to avoid injuring the fruit with their finger nails.

Sanitation in Packing Houses

Blue mold fungus lives on organic matter. In many groves dropped and split fruit are sources of infection. Mashed fruit and culls left lying about in the packing house furnish ideal conditions for the multiplication and growth of blue mold. All drops in the groves should be removed. Packing house and field boxes should be cleaned. Crushed fruit and culls should be kept out of the packing house.

Most fruit is sold by auction companies. Each lot is graded and sold according to general appearance and the amount of rot. A few decayed oranges will greatly affect the price. A little care at the time of picking and packing will make a great difference in the returns.

Several years ago the cause of this decay was not fully understood. Many theories were advanced by growers and shippers to explain their losses. Some attributed the decay to the influence of a certain type of soil, causing a possible degeneracy in the fruit as the trees grew older. Others believed it to be due to climatic conditions, such as fogs and rains. Many thought it due to inherent weakness of the fruit. Some believed it due to faulty methods used in packing houses. All believed and agreed that improper and inadequate transportation was largely the cause of the decay.

A certain grower in Florida was losing 30 per cent of his fruit in transportation. He thought it the fault of the railroad companies. He found by investigating that it was due to clipper cuts and long stems.

Railroad companies are not responsible for decay, if cars have been properly handled during transportation. They have a right to fight claims for loss in such cases.

If the produce arrives on the market in an unsightly, decaying mass, it sells as such. Good fruit sells for less, if there is decayed fruit in the same box.

The Care of Young Citrus Trees

By D. W. Hadsell, Citrus Pomologist

Buy or grow the best nursery trees obtainable. With these as a start subsequent intelligent care will produce in a favorable environment a healthy, productive grove at an early age. Thorough preparation of the land is very advisable before planting. On pineland soils it is well to remove all timber, stumps and roots, plow deeply, plant watermelons for a spring crop, followed by a leguminous cover-crop of velvet-beans or cow-peas in the summer, these to be plowed under in the fall, and the ground thoroughly cultivated to level it, promote aeration and nitrification, and put it in fertile condition for tree growth and in good shape for planting. Initial sourness of soil is thus reduced without the application of lime, which has been frequently found to be an unfavorable procedure on pineland citrus groves. In planting the above cover-crops it may be well to inoculate the soil to be planted with the symbiotic bacteria which inhabit the roots of the legume selected, especially if the experience of local growers indicates that good crops are not to be expected on local soils the first year. Probably the greatest need or lack of our pineland citrus soils in Florida is a plentiful and constant supply of humus, which itself is the dominant criterion of an abundant available soil-moisture supply, and lively growth of bacterial flora in the soil. Thus every effort should be directed toward growing and plowing under a large cover-crop before planting the grove, and regularly thereafter during each summer. Leguminous cover-crops are preferred, as they greatly increase the total supply of nitrogen in the soil and thus constitute a considerable saving in outlay for this costly element of commercial fertilizers.

On hammock soils the preparation of land is different. In cold sections the native growth of palmetto trees is often left standing after the other timber has been cut, to aid in the protection of grove trees from cold damage during freezes. It is well to remove the balance of the timber, rather than to deaden it and let it stand; and to remove all live-oak stumps, as well as a few of the palmettos, so as to allow adequate space between tree rows for cultural operations and harvesting. It is seldom necessary to lime a hammock soil for citrus planting; on low hammock soils which are poorly drained or exceptionally sour, it is customary among many growers to apply good hardwood ashes around each young tree-site before or after planting.

D. W. HADSELL

Successful tree planting requires special attention to at least four essentials: Keep the fibrous roots damp, and alive, during the transfer of trees from nursery to field; make sure that the crown of the tree is as high, or a trifle higher above the soil, than it stood in the nursery row; in planting it, provide for good root distribution; and lastly, water the trees in the field frequently until their new root system becomes established, and rains occur. If the fibrous roots of the nursery tree are allowed to dry out after removal from the nursery row, they will rapidly die, and then if the trees are planted in the field they will make little or no growth until a new set of fibrous roots are grown, and such trees are said to be poor trees, whereas the real trouble lay in careless handling from nursery to field. Keep the roots of nursery trees wet, or very damp and cool, until they are planted or "heeled in." It is well to dig a large hole in which to plant the tree. On the bottom of the excavation pile a cone of top soil. Force the pruned tap-root down through the point of the cone, allowing the fibrous roots to spread out evenly on the sloping surface of the cone. Fill in the hole about four-fifths full and fill the hole with water. After the water has soaked down into the soil fill the rest of the hole with dry soil, making a rimmed basin around each tree for later watering, about two or three feet across. On low, wet land, adapted to sour orange stock, where water is likely to stand for days or weeks during rainy periods, it is highly advisable to hill or ridge the plantation. Ridging provides for drainage, if the furrows run down slope, and this system makes it possible to grow fine groves on low, rich lands, and provides, moreover, a constant high-moisture content along with adequate drainage, resulting in startling rapidity of growth and heavy production. Mr. G. Ringdahl has grown a seven-year-old grove under these conditions to a size as large as a "seedling" tree of 25 years of age, and from this grove at White City, in St. Lucie hammock belt, has picked 1,500 boxes of grapefruit per acre. Mr. Ringdahl, however, has been known to apply as much as 20 pounds of fertilizer per tree during the first year's application and consequently gets very rapid growth, his trees coming into heavy bearing at an early age. He believes, however, that such heavy fertilization with the usual green and chemical fertilizers would seriously injure citrus trees.

In fertilizing young trees, apply the first year from four to five applications, starting about March 1 and ending about September 15 to October 1. Use from one-half pound to three pounds per tree on high, dry pineland soils each application, depending upon the composition of the fertilizer, the advice of the manufacturer, and the haste of the grower to obtain a bearing grove. On rich soils where abundant moisture is constant and drainage adequate, the applications have a still wider range as to amounts employed. A grower may, for instance, produce a bearing grove six years of age without any commercial fertilizer and at very low cost, as Mr. J. J. Parrish, a well known shipper, and grower of the "Nevins" and "Confidence" brands of fruit, has done in the "Turnbull Hammock." Or a grower may go to the other extreme, as cited above,

and apply Mr. Ringdahl's methods, provided that a seasoned fertilizer of bone and guano base is used, and thus at a greater cost produce a bearing grove in less time. Wherever the grove is planted, and whatever the amounts applied, it is inadvisable to place stable manure, green bone or chemical fertilizer in considerable amounts in the hole directly under the roots of a newly planted tree. The former two organic materials heat during decay and kill the tree roots, while the chemical fertilizer thus applied kills roots by causing too high a soil-solution concentration.

A suitable analysis for young trees will show 4 to 5 per cent ammonia, 6 to 8 per cent available phosphoric acid and 3 to 4 per cent soluble potash. This analysis, formulated on a bone and guano base, and thoroughly seasoned or rotted, provides for maximum, steady, well-balanced growth of leaf and limb, and does not induce mal-nutrition, dieback, frenching or other physiological diseases of the tree. Frequent applications, every six weeks or so, in moderate amounts, are more efficient than fewer large applications. In the past stock advice conventionally offered to the uninitiated has advocated four applications a year, of one-half to one pound per application the first year, two pounds per application the second year, three pounds the third year, and four the fourth. Using this as a foundation, the grower may increase these amounts if he uses "safe fertilizer," and if he also desires maximum growth and has a soil well drained but highly retentive of available moisture. He may decrease these amounts on a rich hammock soil if he wishes to decrease the cost of raising the grove and does not care to hasten its bearing period.

If the young tree has not been topped in the nursery, it should be headed back to about two and one-half feet when set in the field. This will result in stockier trunk growth and is necessary to start the formation of a low-headed tree. Trees dug in the nursery with bare roots are received by the grower as "whips" or straight canes, entirely defoliated and branches removed. During the first year's growth in the field all leaves and shoots may be left to shade the trunk and increase its growth. Before the second year's growth starts, about five branches should be selected, well distributed on each side of the upper 12 inches, and all the others cut off. No more shoots should be allowed to grow on the lower 18 inches of trunk. Suckers and water sprouts should be cut off as fast as they appear, and the top of the tree developed entirely from "fruiting-brush" type of wood. When overhanging branches become too pendant, shorten them back to an upright growing bud, and in this way direct the growth of the tree so that the top will be almost entirely included within an angle of 100 to 110 degrees. All interfering, misshapen and diseased branches should be pruned off regularly. With these precautions taken, a strong tree framework, admitting sufficient light and air will be insured to carry a heavy load of fruit in later years and hold it off the ground.

As soon as the banks protecting the buds are removed in the spring, start intensified cultivation to maintain a dust mulch for cultural irrigation and to keep the fibrous roots three or four inches deep in the damp soil, thus preventing their death through drying out in the surface soil during drouthy periods. At the beginning of the rainy season allow a cover-crop to grow and, in early fall, on pineland soils, cut this cover-crop, allow it to dry and then plow it under. Hoe the trees and thoroughly cultivate the middles. Cultivation in late fall should be reduced and entirely stopped during winter, so as to avoid undue stimulation during cold weather.

When young trees become infested with whitefly, scale and other pests, or infected by scab or other serious diseases, they should be well sprayed. Use from 200 to 250 pounds pressure, and be guided as to materials, concentration and time and frequency of applications by the government spraying schedule, which may be procured from the State Agricultural Experiment Station at Gainesville, Fla. The physiological disease known as dieback is frequently the cause of poor growth and bad results in young groves. This condition or disease may be cured by applications of bluestone, and no time should be lost in consulting the county agent or other competent authority as to the proper amount to use. Too much may kill the tree; too little will do no good.

Frenching, or chlorosis, is another frequent cause of reduced growth of tree. It is often induced by liming pineland soils; by the death of soil bacteria, possibly; and is largely prevented by a constant and generous supply of humus and organic plant food in the soil.

Close attention to all of these and other prime factors of tree care will make a healthy, strong and vigorous bearing grove in record time, and net early and continuous profitable returns to the enterprising grower who is "above the average."

PRUNING YOUNG CITRUS TREES

Start your young trees right and do not let your pruning be such as to throw them back in their growth, says E. F. DeBusk, county agent of Lake county. In pruning young citrus trees it is good practice to allow all vigorous growth that comes out above the union of the bud and stock to grow for one season after the tree is transplanted to the grove.

The leaves are the factories in which material from the soil is converted into plant tissue. There is no time in the life of the tree when these litite factories are more important than the first year after leaving the nursery row. Therefore, to get maximum growth it is necessary for the tree to have sufficient leaf capacity to utilize all raw plant food available to the roots.

In order to insure having leaves, cut back the young tree to about 16 to 20 inches when transplanting. A longer trunk is liable to become dried out and hardened, and, thus make impossible the formation of leaves. But, if the trunk is short, there is little danger of its becoming dried out; the sap will rise and the tree will get a good start.

PRAISE FLORIDA GRAPEFRUIT

The Minneapolis Tribune recently carried the foHowing article on its front page:

"To persons familiar with them, no other fruits are quite so appetizing as the big, tree-ripened Florida grapefruit, and they have pronounced food and health values.

"Medical research has established the fact that the vitamines so essential to good health are supplied in maximum quantities by the citrus fruits, including grapefruit.

"Housekeepers who buy for the full worth of their money should insist on the large-sized grapefruit for the remainder of this season. The advertised, trade-marked brands naturally are more dependable. Florida oranges also are at the best just now, the heavy weight indicating large quantities of juice. Fully ripened on the trees and tasteful in the extreme, oranges from Florida vie with grapefruit in healthfulness."

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TO PROTECT FLORIDA FRUIT

THAT it should be necessary to enact laws to compel fruit growers and shippers to protect their own interests by withholding shipments of immature fruit would appear beyond belief. Self-interest, it would seem, should be the only law required to enforce such a restriction.

Yet that such a law is recognized as a necessity by the growers and shippers of the state is evident from the unanimity of sentiment and action brought out at a meeting of the various marketing agencies of the state at DeLand recently.

That Florida growers and shippers have suffered great loss and that the reputation of Florida fruit has been seriously injured through the shipment of immature fruits, has long been recognized by all Florida citrus interests. Yet the practice of making such shipments has been repeated each year, to the still further detriment of the industry in the state.

Recognizing this condition, and the need for some legislative enactment to rectify the practice, practically all of the citrus interests of the state appear to have united in effort to bring about such laws as will forever put an end to such shipments.

A legislative committee composed of representatives of practically all interests was appointed at the DeLand meeting to work out some law which will meet the requirements of the industry, and to formulate a draft of their findings into a bill which will be presented to the legislature with a recommendation for its enactment. A bill closely resembling the California law was favored by most of those present at the gathering in DeLand.

SEEING THE BRIGHT SIDE

WHEN a grower has just pocketed a loss from the sale of his crop is not an auspicious time to preach to him the doctrine of optimism. And yet, The Citrus Industry believes that the lot of the average citrus grower is not half bad. In comparison to the lot of the wheat farmer or the cotton planter or the rice farmer, the citrus grower is in a class to be envied.

True, few citrus growers have made any profit from the crop just marketed or being marketed. Some have lost money—a few have lost heavily. Among the buyers, the question with which they have been confronted during the present season has not been how much profit they could make, but how little they could lose.

Yet, in spite of all this, we contend that the lot of the citrus grower is not half bad. Many of the growers have been able to break even. A few have even realized a small margin of profit. Where else among the producers of crops from the soil can you find a class who have done so well during this period of deflation and readjustment? Echo answers, "Where?"

The great trouble has been that growers failed properly to read the signs which must have been evident to the careful observer. Deflation was in the air. Readjustment was on every lip. A downward tendency in prices was being forced by every agency. Yet the hope that prices might be better prevailed generally among the growers of citrus fruits. Due largely to the fact that they had wilfully refused to read the signs, or to heed them, they were disappointed—and it is largely due to this disappointment, rather than to the actual losses sustained, that the present spirit of pessimism is attributable. It isn't the actual loss—the actual difference between the cost of production and the sale price—so much as it is the difference between the anticipated price and the price realized—which hurts.

But whatever the conditions of the present season may have been, the grower of citrus fruits has every reason to look forward with optimism to the future. True, a largely increased acreage of producing groves must be met from year to year, and this new production must be reckoned with. But, on the other hand, there is an ever increasing demand for citrus fruits. The consuming power of the country is growing far more rapidly than the possible increase in production. The period of readjustment is about over. With this period ended, there is bound to come a greater stability in price levels. All of these things will benefit the grower.

A wise old Texas ranchman once said that "the time to get into the cattle game is when the prices for cattle are low—by the time you can grow a new crop of cattle the prices will be high." Something of this spirit of optimism should actuate the citrus grower. By the time the next crop is ready for the market—certainly by the time that new grove comes into bearing—conditions will be greatly changed; as we believe, for the better.

We repeat, this is a time for optimism among citrus growers, and there is no good place in the citrus game for the man who cannot grasp the perspective of a brighter future.

A NOTABLE ACHIEVEMENT

IN making its first shipment of "Blue Goose" grapefruit to London, the American Fruit Growers, Inc., has demonstrated that the marketing of American citrus fruits in England is not only feasible, but that our British cousins both enjoy and appreciate the finer grades of American citrus fruits.

Having paved the way by this initial shipment of grapefruit to London, it is to be anticipated that the American Fruit Growers and other American distributing agencies will be encouraged to cultivate a field which has long been supplied almost exclusively by the groves of Southern Europe. That a market for American grapefruit especially can be developed in England appears to be entirely within the range of possibility.

The American Fruit Growers, Inc., is to be congratulated upon demonstrating so thoroughly that American grapefruit can be placed on the British market in the pink of condition and that American citrus fruits so shipped can hold their own with the best products of the world.

"The best advertisement Lee county ever had," is the way one enthusiastic Fort Myers booster describes the Lee county edition of The Citrus Industry.

PRESERVING THE FORESTS

THE CITRUS INDUSTRY has had much to say along the line of reforestation—and will have more to say. Indeed, The Citrus Industry was the pioneer among Florida publications in bringing this matter prominently before the people of the state.

Citrus growers and other citrus interests have recognized the importance of the matter and have taken an active part in creating interest in the movement.

That the question of reforestation is national in its scope is shown by the following editorial from the Boston Post, written in advocacy of adequate congressional appropriation for carrying out the provisions of the Snell bill:

"On the general proposition that the forests of the United States, once considered inexhaustible in our former care-free style, but now known to be threatened with extinction unless we change our ways, should be protected there is no very strong dispute. We have learned something in the past 50 years. We see that Dame Nature, though prodigal with her primitive gifts, will not permit men to slaughter them away and still have them. So we have turned to the law-making powers of the land to help us in the matter of forests. They have done much, but there is still more to do.

"We are now straight up against the necessity of having some comprehensive national forestry program if we would provide a continuous supply of timber for the people and of material for one of the public's prime necessities—the newspaper. In this crusade appears vigorously and with keen foresight the American Forestry association. The fact that it stands sponsor for the Snell forest preservation bill, introduced into congress last December, argues well for the bill, which was prepared with great care by a group of users of timber, as well as the chairman of the committee on national forest resources of the American Newspaper Publishers' association, and with the assistance and under the advice of National Forester William B. Greeley. Briefly it sets out to do these things:

"Provide forest protection and renewal in co-operation with states and other agencies, but with federal expenditures for this purpose not to exceed expenditures of the co-operating state.

"Direct survey of forest resources and timber requirements of nation.

"Appropriate $2,000,000 yearly for five years to carry out provisions 1, 2 and 3, of which $1,000,000 must be for forest protection.

"Appropriate $1,000,000 yearly for five years for forest research and investigations in wood utilization, including study of forest taxation.

"Appropriate $1,000,000 yearly for five years for reforestation of denuded lands in national forests.

"Appropriate $10,000,000 yearly for five years for acquiring additional land for national forests.

"Define procedure in purchase of lands suitable for forest production.

"Authorize acquisition of similar lands by exchanges of land or timber, when clearly in the public interest.

"Provide for classification of other public lands which are valuable chiefly for timber production or watershed protection, and appropriate $250,000 yearly for five years for this purpose.

"Provide for addition of such lands to national forests upon recommendation of national forest reservation commission.

"There is a program that looks forward, and in a practical way. It is not afraid to spend money—but all the expenditures proposed are small enough in comparison with the billions to be saved to posterity, and even to ourselves before posterity puts in appearance. It would get at the very base of forest waste. It would be one of the best forms of insurance that Uncle Sam could take out. Let us hope that cheese-parers in congress will not balk at the payment of the premium. The bill ought to pass."

ANOTHER "SLAM" DISPROVED

THE Florida Development Board calls attention to a recent inaccuracy contained in a bulletin issued by the Industrial Employment Survey in regard to unemployment of industrial labor in Florida. The glaring inaccuracies of the statement, while doubtless unintentional, were of such a nature as to at once direct attention to them.

The Florida Development Board promptly secured a copy of the government bulletin and then made a quick survey of two industries to check up the figures given in the report, proving that they were grossly inaccurate. Under the building trades division there were more persons employed in the smallest Florida county, Pinellas, than was credited to the entire state in the report. The United States Department of Labor has been asked to publish a correction of their previous report and the services of the Florida Development Board has been offered to them in securing accurate information about Florida industrial employment conditions, which in fact are much better than in most states.

Senator Duncan U. Fletcher called the matter to the attention of congress, stating that the erroneous publication regarding economic conditions throughout the country unjustly reflected upon Florida, and he read into the Congressional Record an editorial from the Florida Metropolis, using a letter from Willis B. Powell, secretary of the Lake County Chamber of Commerce, containing the following paragraph:

"This last attack upon Florida again proves the need of the Florida Development Board, an organization that alone can combat these insidious attacks, provided the state supports it as a unit."

Many readers of The Citrus Industry are taking advantage of the services of D. W. Hadsell, pomologist. His services are free to readers of this magazine, and he will gladly answer any queries on citrus topics. Enclose stamp for reply.

Conducting a magazine is not so much different from operating a grove. Just about the time the editor begins feeling comfortably at home in the presence of his secretary, she decides that she needs a change of environment and starts him out in search of a new divinity. And just when the grower thinks he has conquered his grove problems, some new and strange difficulty arises to "set him guessing." Whether it is the sanctum or the grove, life is just one thing after another.

Some time ago The Citrus Industry declared that no one ever retired from the citrus game, once he had become inoculated with the serum. In proof of this assertion, The Citrus Industry points to the achievements of Judge W. S. Preston of Bartow, who, at an age where most men are ready to retire, has just completed the planting of a 120-acre grove, and who now is planning an "experimental" planting of another "forty" just to see how a theory will work out. Judge Preston has been planting groves in Florida for nearly a third of a century.

Citrus Fruits in Bushel Baskets

By M. S. Cohen

In the shipping and marketing of fruits and vegetables, the containers used are normally decided by custom. The package that has always been used is the package that is customarily given preference. It is a strange fact that there is more or less—and sometimes marked—disapproval when a new idea in the way of a shipping container is introduced. But, demonstrated "net profit" for the grower and shipper, to be secured through the use of a container that is designed somewhat different from the regulation type package, is a powerful convincer.

Several years ago, Messrs. Weinberg Bros., of Galesburg, Ill., were revailed upon to give the bushel basket a trial in the shipping of their citrus fruits. They had a carload of oranges in their Florida grove that did not warrant wrapping. These oranges they packed in bushel baskets and shipped them North: The results of this experiment proved so satisfactory to them that they are now shipping on an average of 20 cars a season, all packed in bushel baskets, from their orange, grapefruit and tangerine groves located in Cocoa and Plant City, Fla.

Weinberg Bros. have found that the bushel basket was the means of a reduction in the marketing costs of their oranges, grapefruit and tangerines, and that this citrus fruit sold with greater rapidity—the retailers showing a preference for the bushel basket. The marketing and shipping of citrus fruits and other fruits and vegetables in bushel baskets has a tendency to increase consumption, for the bushel basket, which is a U. S. standard bushel, is the right quantity for the average family.

The method of loading a refrigerator car with citrus fruit packed in bushel baskets, depends on the size of the car. On one occasion the Six-Six Inverted Method was used. It happened to be a small car and was loaded with the following citrus fruits: 100 bushel baskets of tangerines, 150 bushel baskets of oranges and 190 bushel baskets of grapefruit, making a total of 440 bushel baskets of assorted citrus fruits. Some of the cars are loaded the Four-Three Alternate Method. In all instances the baskets are stacked five tiers high. As high as 576 bushel baskets of citrus fruit was loaded to the car.

Most of their shipments of citrus fruit in bushel baskets originate from Cocoa and City Point, Fla, and move to northern points, arriving at destination in perfect condition.

At Galesburg, Ill., Weinberg Bros. have a cold storage house in which the citrus fruit is placed. Dealers and retailers call at this cold storage house and put on their trucks as many bushel baskets of oranges, tangerines or grapefruit as they will have use for. The retailers give preference to the bushel basket, because the basket makes it easy for them in which to display the fruit, and again, the basket enables easy inspection. The Weinbergs are well pleased and satisfied with the results they are getting by shipping their citrus fruit in bushel baskets.

Mr. Frank T. Miller of Buffalo, N. Y., on one occasion received a car of bulk oranges. They were unwrapped, loaded in the car about three feet deep. The oranges were then packed in bushel baskets and offered for sale. Considering the condition of the orange market at the time, the prices received for oranges packed in bushel baskets proved satisfactory. The retailers took to the bushel basket pretty well. The retailers claimed that the basket was of more use to them after the package was empty than the box.

From observations made in Chicago, retailers would like to have citrus fruit packed in bushel baskets. Some of the retailers even now are emptying oranges and grapefruit out of the original boxes and putting them into bushel baskets. In one A. & P. store Florida grapefruit and Sunkist oranges were placed in bushel baskets. The manager stated that he could sell more fruit of any kind out of the bushel basket than out of any other package he had ever used.

Keen interest is being shown by the fruit and vegetable growers throughout the entire producing regions of the United States in the bushel basket as a practical and economical shipping and marketing container for most varieties of fruits and vegetables.

The bushel basket has proven to be quite a favorite with thousands of progressive fruit and vegetable growers and shippers, on account of the ease in handling, packing and closing. It has also proven to be quite a labor saver. Furthermore, the bushel basket is steadily gaining in favor among the retailers because of its display advantages and general utility.

In the final analysis, the bushel basket is used by growers and shippers who appreciate the value of pleasing their customers. Many growers and shippers have discovered this. Bushel baskets create a feeling of confidence between seller and buyer and confidence is the basis of all good business dealing.

RUST MITE CONTROL

Damage to citrus fruits by rust mites has been severe this season because rains a few weeks ago interefered with efficient spraying. A number of groves were not sprayed at the proper time, the owners or managers being unaware of the presence of the insects until the damage had been done.

Rust mites are so small that it is practically impossible to detect their presence with the naked eye unless assembled in large numbers or until considerable damage has been done. When "russett" fruit appears it is too late to prevent all the injury.

Every grower should provide himself with a good hand lens and make frequent examination of the leaves and fruit, says K. E. Bragdon, county agent for Brevard county. If as many as 50 mites can be counted on each of a number of leaves taken at random, or if only a few are found on the fruit, spraying should not be delayed.

When present in large numbers the fruit and leaves have a dusty appearance, the dust being the tiny insects. When only a few are present the hand lense is necessary for detecting them. In shape they resemble a short carrot—much larger at one end than at the other. In color they are a very light green—much lighter than the color of green fruit or leaves.

The spraying material is lime-sulphur solution. It is best to purchase the commercially prepared materials, since they are usually better mixed than any of the solutions the grower can prepare for himself.

A "Big Business" Syndicate Comes to Tampa Territory

BRUCES TAMPA HIGHLANDS SYNDICATE Starts on a Million Dollar "Golden Fruit" Grove, Home and Farm Development Work on Their 13,000 Acre Tract of Citrus Fruit, Vegetable and Farm Land Near Tampa

THEIR SLOGAN:

"Nothing Like It in All Florida"

That the Tampa territory is rapidly "Coming into its own" is evidenced by one-after-another of "Big Business" men, corporations and syndicates that have been investing their money in small and large tracts of land and in all kinds of business in Tampa and in development work in its wonderful "Back Country" during recent months and years.

The latest "Good News" to all interested in the development and building up of the Tampa Territory until it becomes "One of the most popular, populous and wealthiest sections in the United States," is the recent announcement of BRUCES TAMPA HIGHLAND SYNDICATE.

We call the attention of our readers and others interested to the character and location of their tract of land, which is briefly referred to in their advertisement in this issue. Ask them for further particulars and a free book about Florida, written and "Fathered" by Ex-Senator J. E. Bruce, formerly an Iowa banker and extensive real estate investor throughout the Middle West for over forty years.

That Senator Bruce is a successful "DO-ER" in organization, financial and development work is evidenced by the following quotations taken from two of several private personal letters that we have read written by LEADING MEN in Iowa and Chicago:

A VICE-PRESIDENT of the second largest bank in the United States says: "I HAVE ALWAYS REGARDED MR. JAMES E. BRUCE AS A MAN OF ABILITY AND A GOOD ORGANIZER." THE PRESIDENT of another Chicago Bank says: "I BELIEVE ANY STATEMENT THAT MR. BRUCE WOULD MAKE COULD BE ABSOLUTELY RELIED UPON."

Senator Bruce made his first trip to the Tampa Territory in the summer months of July and August, 1918. His conversion from a skeptic regarding the unequalled all-the-year around congenial climate and "Business Outlook" of the Tampa Territory is probably best evidenced by the fact that he only "Worked Six Days," making investigations and only "Rested on the Seventh" after he bought this large tract of land which he named "BRUCES TAMPA HIGHLANDS."

The "Close" Syndicate organized by Senator Bruce and his son, Clarence W. Bruce, President of the Bruce Motor Truck Company of Tampa, is composed of several bankers and "Big Business" men in Iowa, Illinois, Wisconsin, New York and Florida. Space forbids the publication of their names here, but Senator Bruce informs us that he will cheerfully furnish a complete list of his associates, with full information as to how others can get in on the "Ground Floor" as co-operating members in the Syndicate organization.

While a considerable portion of the tract has already been sold in tracts of ten acres and upwards, and several substantial residences and roads have been built and groves already planted, the Syndicate has only recently moved its general offices from Chicago to Tampa and from now on the work will be actively pushed. The Company has one of the very finest and most beautiful suite of offices in the City of Tampa on the sixth floor of the new Stovall Building on Tampa Street. Senator Bruce and the General Sales Manager, W. L. Overman, are in charge. You will find them interesting gentlemen to meet, no difference whether you are interested in buying virgin land or a five-year-old "Golden Fruit" grove or not.

LET THE GOOD WORK GO ON IN THE TAMPA TERRITORY—THE MORE THE BETTER.

Educators Endorse General Extension Work

Florida educators have put their stamp of approval upon the work of the General Extension Division of the University of Florida, and at a recent state conference of the county superintendents and other school officials and principals held at Live Oak, they passed a resolution endorsing the work of the division and requesting the legislature to furnish adequate support.

The Florida Educational association, made up of teachers of the state, had also previously endorsed the work of the division for "carrying to the people of the state, through correspondence and home study, professional, industrial, commercial and general educational opportunities, not otherwise open to them; and for its splendid effort to develop a co-operative community spirit with its attendant beneficial effects on the state as a whole." These endorsements show that the division has adapted itself to the special needs of the people and is filling an important place in our educational system.

In speaking of the work, B. C. Riley, director, says: "The general extension division, among other things, is making an effort to get the young people of the state to prepare to fill the teacher vacancies in our schools, and to encourage the teachers to better qualify themselves for the work. As a result, nearly 700 teachers and prospective teachers have received normal instruction through this department.

An effort has also been made to encourage graduates of junior and intermediate high schools to finish their preparatory work and take the necessary intercollegiate work by correspondence study, so that they can enter professional and technical schools and prepare for greater service to the state. That the division is bridging the gap which halts the education of so many young people is shown by the fact that nearly one hundred more students than went to college in a single year are now finishing their preparatory and taking college work by correspondence.

Ex-service men, who for any reason cannot attend school, are also given courses by mail, and there is a considerable enrollment from 20 counties of the state. The division is doing a type of work that can be done in no other way, and letters of appreciation, that have been received in the last few weeks, come from all parts of the state.

Among others, a student in an isolated part of a southern county writes that his lessons to us were the first writing ever done with a pen. A well known business man in Hillsborough county, because of business and family ties, finds the extension method of instruction is the only one open to him without embarrassment. Another letter was received from a young widow in Lake county, with five children, who is preparing herself through correspondence-study, to teach in order that she may make a living for her children.

PACKING HOUSES ARE RUNNING VERY LIGHT

On accouut of the market condition both the local packing houses are running but part time. The Dade City Packing company has been packing the fruit from the town lots and small groves close in, and has shipped a few cars to southern points without packing.

England Offers Rich Market for American Fruit

London Representative of U. S. Bureau of Markets Congratulates A. F. G. on Shipments

There is no doubt left in the minds of officials at the American embassy in London that American fruits can be shipped overseas and still compete with the best.

The American Fruit Growers, Incorporated, shipped some of its Indian River Blue Goose grapefruit to London in December and several boxes were distributed as Christmas presents. The American ambassador, the royal household and American and British officials were presented with the fruit. Among the many letters of congratulation, one of the most appreciated was the following from Edward W. Foley, representing the U. S. Bureau of Markets:

"The box of Indian River grapefruit arrived Christmas eve in excellent condition.

"It was admirably packed and the physical condition of the fruit was all that could be desired.

"If the American Fruit Growers can land considerable quantities in the same condition, I am sure they will develop a profitable market here for their fruit.

"I distributed it about the embassy and sent some to Consul-General Skinner and to Captain Scott of the shipping board. All pronounced it excellent and wondered at its splendid quality and condition.

"It was in a class of its own when put alongside the best that Selfridges put on sale in its American shop.

"I wish to thank you very much for your kindness, and congratulate you and the American Fruit Growers on your successful achievement.

"Yours very truly,

"EDW. W. FOLEY."

Legislators Urged to Protect Citrus

A meeting to actively sponsor a better law to regulate the shipments of green and immature fruit out of this state was held at DeLand on February 26, at which representatives of every section and practically every large citrus interest were present. In addition two members of the next legislature were actively in attendance, Messrs. Parrish of Titusville and Young of Vero, who are showing considerable interest in the matter, at the request of their respective constituencies.

The meeting was called by Judge A. G. Hamlin of DeLand, chairman of the legislative committee of the board of directors of the Florida Citrus Exchange, and was for the purpose of obtaining the sentiments of other citrus interests in the state. The discussion covered all phases of the situation, agreements finally being arrived at that a law closely following the lines of the law now in effect in California will best serve the purpose of restricting the shipment of green fruit, while avoiding many features in other proposed measures which were held by some to be objectionable.

Following agreement as to the general terms of a new law, Mr. Young of Vero, who presided as chairman of the meeting, appointed a committee of seven representatives as follows: W. J. Krome, Homestead; Judge A. G. Hamlin, DeLand; John S. Taylor, Largo; F. L. Skelly, Orlando; J. J. Parrish, Titusville; M. J. Daetwyler, Orlando, and D. S. Borland, Fort Myers, which was empowered to draft the bill and work out all necessary details so that the matter may be taken up and actively championed by the great majority of citrus growers in the state. The growers are said to be strongly in favor of some measure which will stop the recent practice of wrecking the northern markets each fall with immature and inedible Florida oranges and grapefruit.

Dust With Sulphur to Kill Red Spiders

J. R. Watson, Entomologist Florida Experiment Station

Red spiders are beginning to do considerable damage in various parts of the state. They attack a variety of plants. Peas, strawberries, beans, citrus, cotton, violets and camphor are probably the most liable to attack of the domestic plants.

Infested plants become gray and dried up in appearance and finally turn yellow and die. Strawberries turn brown and remain small and hard. If examined closely, infested plants, particularly the under sides of the leaves, are found covered with a web of fine silk under which the minute yellowish mites can be seen with the naked eye. Under a good lens one can readily discern the eight-legged adults which are from red to green in color, the bright red eggs, and the white skins which were cast off when the spiders molted.

These spiders belong to a group called spider-mites, which includes the rust mites of citrus. The best remedy for any of these spiders, or mites, is some form of sulphur.

One may use either free sulphur, or some of its compounds, applying it dry or in the form of a spray. Free sulphur is one of the best remedies against red spiders. It is somewhat slower in its action than some compounds of sulphur, often taking two to three days or more to do its work, but it remains active for a long time, frequently two or three weeks, and usually kills the mites.

Sulphur can be applied dry and be driven into the citrus trees or strawberry beds by means of a blower or duster. In the strawberry patch it can be applied by hand, or shaken into the vines through a closely woven cloth or a perforated can.

It is advisable to mix sulphur with hydrated lime (3 to 1). This lime may be made by adding 32 pounds (4 gallons) water to each 100 pounds quicklime. Mix the lime and sulphur thoroughly. It is best to apply the dust at night or early morning, in order that the dust may stick better.

The dust is particularly effective on plants like strawberries, where the leaves lie close to the ground.

Keeping Quality of Florida Oranges

A. V. Stubenrauch, U. S. Dep't of Agriculture

The keeping quality of oranges is naturally good. Since the life processes of the fruit continue after it has been severed from the branch, there is a prolonged period during which an uninjured orange remains sound and free from all decay. Ultimately, when the life span has been run, the tissues die and decay follows even in uninjured fruits. The delay is long enough, however, to allow the average fruit to be packed and placed on the market and to reach the consumer in sound condition.

Heavy Losses From Decay in Commercial Shipments

The losses from decay during transit have been very heavy in the commercial shipments of fruit, and the experimental work of the bureau of plant industry was undertaken in Florida in response to many requests for advice and assistance which came to the department of agriculture. It is difficult to estimate what the actual loss from this cause has been during past seasons. Several reliable commission men who handle large quantities of Florida oranges each year have stated that averaging the good with the bad years probably 10 per cent of the fruit decayed before reaching the consumer. Experimental shipments made under the direction of this bureau indicate that the loss may have been fully as heavy as this.

Reputation Injured by Decay in Transit

Unfortunately, the financial injury is not confined to the fruit actually decayed. It is impossible to estimate the loss which has resulted to the industry from the bad reputation which Florida fruits have gained in the trade. While it is difficult to discover how far the low prices occasionally received have been due to this cause, many fruit handlers in northern markets condemn very strongly the poor keeping quality of the Florida orange and willingly admit their intention of using fruit of better keeping quality if they can obtain such from other points. The situation of the Florida orange grower would be critical indeed if it were not for the fact that fruit handled carefully shows so much less decay than does fruit picked and packed under careless commercial conditions.

History of the Department Work in Florida

Investigations by the department of agriculture, having in view the discovery of the factors underlying the successful shipment of oranges from Florida to northern markets, began during the season of 1909. The work, which was planned along lines similar to those followed in the California investigations, included the determination of the character and type of handling employed in the various operations of preparing fruit for shipment and the discovery of the relationship between present methods and the occurrence of decay. The object of the work of the department was to suggest changes in the industry which should reduce the immense annual financial losses of the Florida growers by enabling them to market their fruit in sound condition.

The first researches in Florida were conducted by Mr. L. S. Tenny, who devoted his attention to an inspection of the work done by various picking crews and individual pickers, as well as the character of work being done in the packing houses. It required only a short time to indicate that what had previously been found to be the case in California was also true in Florida, viz, that the fruit was receiving considerable injury in the course of its preparation for shipment. Conditions were, if anything, somewhat more exaggerated, owing to the fact that the thin-skinned, juicy Florida orange is of a more tender type and is more easily injured than the bulk of the oranges grown in California. It is safe to say that the kind of handling which would enable the California orange to go through the various picking and packing operations without injury is not safe for the Florida product. The importance of avoiding dropping or puncturing by long stems is most urgent when dealing with thin-skinned, juicy fruit. The necessity of handling with extreme care so perishable a product as the Florida orange cannot be too strongly emphasized.

After the determination of the character of work being done and the discovery that considerable injury was being inflicted on Florida fruit, the investigations were so planned as to determine whether it was practicable to handle the fruit with sufficient care to prevent injury. At first demonstrations corresponding to the ones carried on in California were made in the packing houses, using fruit selected for soundness and similar lots showing injuries of various kinds. The effects of dropping the fruit and of washing it to remove sooty mold were also demonstrated. These lines of work proved conclusively that blue mold develops wherever the skin of the orange is injured in any way, and that dropping is followed by serious decay, especially when the fruit falls into a receptacle containing dry twigs, gravel, splinters, or other matter rough enough to bruise or puncture the skin.

After the packing house demonstrations, showing that sound, uninjured Florida oranges are not affected with blue mold decay, shipping experiments under commercial conditions were undertaken. These experiments consisted of forwarding boxes of fruit of known history to Washington, where the percentages of decay were carefully determined on the day of arrival, and after one, two and three weeks, the fruit meantime being held under ordinary open market conditions.

These experiments were followed during five successive seasons, thus enabling the investigators to determine the effect of seasonal influences. The data obtained during 1910-11 and 1911-12, when the work was undertaken on a more extensive scale than in the former seasons, corroborated the early results without exception, and the carrying quality of the Florida orange when packed and shipped in sound condition was proved to be as good as that of the California product. An injured orange, whether grown in California or in Florida, will decay whenever the conditions for the development of blue mold are favorable. A sound orange in good, healthy condition, whether grown in California or in Florida, is able to resist blue mold decay.

Blue-Mold Decay of the Orange

The characteristic appearance of the orange decayed by blue mold is too well known to need description. Every handler of citrus fruits knows blue mold, which is by far the most common form of decay. The grower frequently sees it in the oranges hanging upon the trees, when the

fruit has split or has been injured by thorns or twigs. He finds it in the fruit which has dropped to the ground. The packer sees it in the cull pile or in the boxes of fruit left standing in the house for a few days. The receiver of the fruit finds the decay as the boxes are opened, and frequently he smells it before removing the covers.

The first indication of decay is a small area of soft tissue at some point on the surface of the fruit. This increases rapidly in extent if the weather is moist and warm, and within a day or two a bluish or greenish spot develops. If weather conditions continue favorable, the entire fruit is rotted within a few days, and the surface is generally coated with a bluish or greenish blue mat or powdery covering.

Blue-Mold Fungus

Blue-mold decay is caused by the growth of a minute organism within the tissues of the fruit. Laboratory experiments have shown this organism to be a fungus of the genus Penicillium, which includes the familiar blue mold or mildew on bread, on the surface of canned fruit, and on other vegetable matter. Growth takes place within the orange, the bluish mat on the skin being composed of the fruiting bodies made up of chains of spores, massed together in great numbers. The fungus is spread by means of these spores, which, like the seeds of many higher plants, germinate and grow as soon as they find lodgement under conditions favorable for their development. They require heat and moisture, and when these are present growth proceeds at a very rapid rate. The blue-mold fungus has not the power to penetrate the sound living tissue of a well grown fruit; hence, there must be a break or abrasion of some kind in the skin, through which the disease may find an entrance. When growth has once started, even in a small way, the fungus is capable of killing the surrounding tissues and thus producing material on which to grow. This process continues until the entire fruit is destroyed. If, therefore, a fungous spore is present and lodges in an injured spot, the initial step toward decay has been taken, and if the temperature and moisture conditions during the next few days are favorable, the development of the fungus proceeds rapidly and the orange is almost sure to rot. Many experiments have been made in California and Florida packing houses in placing spores on fresh injuries, and, without exception, the characteristic decay has resulted. On the other hand, large quantities of fruit have been held under weather conditions most favorable to the development of decay, and the results prove that fruit which has been so carefully handled as to preserve the skin in an uninjured condition shows practically no decay, even when the surface has been purposely covered with spores. The development of decay is most rapid during warm, moist weather, fruit packed during a cool, dry period frequently reaching the market without much waste, even though injuries are present. Under changed atmospheric conditions, the same fruit may arrive in a badly decayed condition. During an average Florida winter there are usually periodical warm spells. Reports of general heavy decay at the market end can almost without exception be traced to fruit packed and shipped during these warm periods.

With this understanding of the nature and cause of the most common form of decay, it becomes easy to see how the harvesting and handling methods may have an important bearing on the keeping quality of the fruit. If these are such as to break the skin or injure the orange, even slightly, favorable conditions for the development of blue-mold decay exist and such decay is almost certain to result, as observation has shown that the spores of the blue mold are present practically everywhere. It is safe to say that most of the decay occurring in Florida oranges while in transit is due to blue mold. There is some loss in transit from decay due to other forms of rot, but this is usually very slight as compared with the loss from blue mold.

Causes of Blue-Mold Decay

Since the principal means of securing oranges of good keeping quality is by eliminating mechanical injuries to the fruit, the occurrence of decay is therefore closely connected with the handling methods in use in the grove and packing house.

Thorn punctures, which are made while the fruit is still on the tree, are among the first injuries to which citrus fruits are subjected. These are generally unavoidable, as during every wind storm a certain percentage of the fruit is injured by being blown against thorns. The puncturing which occurs when the fruit is being picked may be prevented, however, although it is frequently difficult to handle the oranges with sufficient care to avoid pressure against thorns or dried twigs when these are present in large numbers. Fruit is often bruised when the ladder is placed carelessly in the tree or when the sack is allowed to strike or is pressed against the branches or ladder. Moreover, filling the field boxes so high that the fruit projects above the top will result in crushing the oranges when the boxes are stacked one on top of another. The oranges may be bruised on their way from the grove to the packing house by being jolted over rough roads in springless wagons. The driver of each wagon should be given a specially prepared seat and not allowed to sit upon the fruit.

Among the most common forms of injury may be mentioned scratches made by the finger nails of the pickers and packers, each of whom should be required to wear gloves. It is comparatively easy for packers, especially if their finger nails are long, to seriously injure a large percentage of the oranges which they handle. Some packers also do a great deal of harm by dragging the oranges around in the bins and by tossing the off sizes into the neighboring bins. Abrasions due to the presence of gravel, twigs, splinters, protruding nails, or other foreign matter in the picking receptacles, field boxes, or packing bins may have far-reaching consequences.

Bruises caused by dropping the fruit in the various stages of picking or packing have been found to cause serious loss from decay. There are a number of places where oranges may be greatly damaged by dropping. First of all, the picker may toss them carelessly into his picking basket or bag. Careless pickers frequently throw the oranges into the open receptacle by means of a shove with the clippers, the fruit sometimes falling as far as three or four feet. Serious damage may also result from emptying the fruit roughly into the field box. The bag or basket may be held too far above the box and the fruit allowed to fall too great a distance. In case the bottom of the box is covered with twigs or small pieces of dirt the injury is greater. A sack which opens only at the top and from which the fruit must be poured into the boxes is likely to cause severe damage because of the bumps to which the fruit is subjected. Usually no greater care is observed when emptying the fruit into the field box and from that into the hopper of the washer, grader or sizing machine. The washing ma-

chine provides excellent opportunities for the infliction of mechanical injuries and for infection from dirty water. This phase of the subject will be discussed later.

Decayed fruit and trash should not be left in the boxes or allowed to accumulate on the floor and under the packing bins. The slightest breeze will scatter great quantities of blue-mold spores from these rotted oranges over all the fruit in the house. A clean, well-lighted packing house greatly diminishes decay by reducing the chances of infection. It has a beneficial influence on the workmen as well, offering a great incentive to better work. Moreover, a clean packing house is a good indication of the character of work being done throughout and indicates whether genuine efforts are being made to improve the methods of handling.

The hopper into which the fruit is emptied has always been the source of much injury to citrus fruits in Florida. In the old style of packing house, existing before the work of the Bureau of Plant Industry was begun, the hopper was frequently large enough to hold a wagonload of fruit. Few, if any, of these are now in use. Even the more desirable small hopper was constructed with such a steep gravity run that the fruit was subjected to a severe bump on reaching the bottom. In going through the machinery or over the grading table other chances for injury occurred, and the final drop into the packing bin was sure to add several bruises. The desirable hopper has padded sides and allows the fruit to be emptied gradually by means of moving belts, which carry the fruit to the washing machine or grading belt; it is not necessary for the fruit to fall by gravity at any stage of its journey.

The most serious form of injury, however, is made by the clippers in removing the fruit from the tree. These clipper cuts are not as prevalent in Florida oranges as was found to be the case in the California fruit, for the reason that the Florida oranges are round and do not have the depression at the stem end which exists in the Washington Navel. Nevertheless, enormous damage has been done to the Florida fruits either by cutting the skin near the stem end when severing them from the branch or by puncturing them with the points. It is essential to have the ends of the clippers rounded or blunted in order to eliminate the possibility of piercing the fruit.

The presence of long stems on the oranges may be reckoned as equally disastrous. For this reason, in determining the character of work being done by a picking crew or individual picker long stems are included as imperfections. A long stem is just as serious, if not more dangerous, than an orange which has been injured in some way. The latter decays, but this rot seldom affects a neighboring orange; whereas a long stem has ample opportunity to injure a number of fruits in their progress from the tree to the packing box. A sharp, ragged fragment of stem projecting from the orange will injure all the fruit with which it comes in contact in the picking bag, field box, brusher, washer, or packing bin. When it is considered that long stems are probably the most common imperfections found in the work of the Florida crews, the importance of giving particular attention to the picking becomes apparent. In most instances it is impossible to avoid leaving long stems, unless the so-called double cut is made. This means that the fruit is first severed from the tree with a stem half an inch long, which is trimmed off when the fruit is held in the hands of the picker. This enables the workman to cut closely and carefully without danger of clipper cutting, and at the same time it prevents him from throwing or "shooting" the fruit into the picking receptacle. Actual experience shows that it requires very little more time to make the double cut, and when the picker becomes accustomed to clipping in this way he can operate practically as fast as with the old method, where he has to use care to prevent clipper cutting. Of course, it takes longer to make a careful double cut than to pay no attention to the character of the work performed. Since the picker is frequently unable to see the stem when the orange is on the tree, he consumes much time in adjusting his clippers in the right position. In making the double cut he is not concerned with the placing of his clippers, simply reaching out and severing the orange with a stem long enough to avoid contact between the fruit and the clippers; then when he holds it in plain sight he can easily make a smooth, close cut.

Evolution of the Florida Citrus Industry

The results of the bureau investigations emphasize the importance of having the fruit arrive in market in good condition and of having it remain sound while in the hands of the wholesale and retail dealers. Shippers are frequently of the opinion that their interest in the condition of the fruit does not extend beyond the percentage of decay found on arrival. It is realized that buyers can claim allowance for such decay, and consequently shippers are usually anxious to prevent it. In their opinion any decay which results after the fruit is purchased is the buyer's loss. This impression is erroneous, for the decay which develops after the fruit is in market is just as direct a loss to the growers and shippers as that which appears during transit. Although the shipper does not have to make a cash allowance for decay occurring during the market-holding period, brands which fail to remain in good condition lose their reputation and ordinarily do not command as high prices as do those which are known for their good market-holding quality. The wholesale and retail merchants want oranges upon which they can depend to remain in sound condition. For such fruit they are willing to pay a premium, while fruit which develops a high percentage of decay before it can be sold has nothing but its cheapness to recommend it. A grower or shipper who consigns carelessly or poorly packed fruit with the expectation that it will remain sound until it gets into market deceives no one but himself. He may be able to dispose of a few cars at fair prices, but the buyers soon learn what to expect and prices fall accordingly. Fruit which develops a high percentage of decay while in the market is the poorest kind of an advertisement, not only for the brand under which it is packed, but also for the section of the state from which it is shipped.

In many cases growers and packers are anxious to do careful work, but they do not realize how many factors there are in the handling operations which may cause injury and therefore decay. They do not appreciate what careful handling means, and they underestimate its importance until the results are demonstrated to them. Injuries causing decay in citrus fruits while in transit and in market may occur from operations through which the fruit is put from the time it is taken from the tree until it is placed in the packing box. It is the prevention of these injuries in grove and packing house that makes up careful handling, and both grower and packer are concerned in knowing how they

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Barnyard Manure for Japanese Cane

By John M. Scott

Japanese cane is being used as a forage to a greater extent every year; more growers are beginning to realize its value, and as a result the acreage in the state is being increased annually. Its use in feeding dairy cattle is approved by the experience of some of the more progressive dairymen in Florida. As a feed for mules in citrus groves, lumber and turpentine camps, Japanese cane is well known and considered one of the best forages.

Fertilizer Tests

Since Japanese cane is adapted to Florida conditions and is likely to become one of the most important forage crops of the state, the results of fertilizer tests made at this station are of interest.

The tests with barnyard manure for Japanese cane were begun at the Florida Agricultural Experiment Station in the spring of 1914. The manure was compared with commercial fertilizer. It was taken from the mule barn and applied at the rate of 30 wagon loads to the acre, applied broadcast between the rows of cane and worked in as the soil was cultivated.

The yields given below are the average yields of green material in tons an acre for an average of six years, from 1914 to 1919:

Plot I was given 84 pounds sulphate of ammonia, 150 pounds acid phosphate, 60 pounds sulphate of potash and 2,000 pounds ground limestone to the acre. The ground limestone was applied in 1914, 1916 and 1918, or every other year. The average yield was 11.3 tons an acre.

Plot II was given 123.5 pounds dried blood, 150 pounds acid phosphate, 60 pounds of sulphate of potash and 2,000 pounds of ground limestone. The average yield was 10.5 tons.

Plot III was given 30 wagon loads barnyard manure. The average yield was 22.3 tons.

Plot IV was given 123.5 pounds dried blood, 75 pounds floats and 60 pounds sulphate of potash. The average yield was 9 tons.

Plot V was given 84 pounds sulphate of ammonia, 150 pounds acid phosphate and 60 pounds sulphate of potash. The average yield was 11.9 tons.

Plot VI was given 84 pounds of sulphate of ammonia, 75 pounds floats and 60 pounds sulphate of potash. The average yield was 10.9 tons.

Plot VII was given 84 pounds sulphate of ammonia, 60 pounds sulphate of potash and 2,000 pounds ground limestone. The average yield was 10.7 tons.

Plot VIII was given 84 pounds sulphate of ammonia, 133 pounds Thomas slag and 60 pounds sulphate of potash. The average yield was 11.3 tons.

Two check plots to which no fertilizer was given gave an average yield of 4.4 tons.

Those plots which received commercial fertilizers were given the same amounts of plant food. The plot which received barnyard manure was given more plant food than any of the plots which received commercial fertilizer, but less in proportion of yields of cane.

Best Yield From Barnyard Manure

In comparing the results of these tests, it is evident that the barnyard manure produced the best yields. In fact, the yield from the barnyard manure plot was double that of any other plat. It will be noticed that there is but little difference in the yield of any of the plots except Plot III (barnyard manure), Plot IV and the check plots.

The barnyard manure plot produced a yield five times greater than the check plots and twice as great as any of the other plots.

Developing Valuable Citrus Tree at Bartow

The Eagle Lake Nurseries obtained an option several months ago on an orange tree in the home tract of the J. J. Boynton place, Main street, Bartow, Fla., for several thousand dollars. The tree is, it seems, an unaccountable development in a grove of trees about 60 years old. Its fruit is most delicious—rich in flavor and color, full of juice, easy to peel, and in every way superior to the average orange or tangerine. The product this season is very small, but this, the owners think, is due to the date of blooming and to the lack of attention, rather than to any fundamental defect in the tree itself. The complexion is dark red-orange; the peel is easily removed, of the kid-glove variety; and the segments are easily separated. The juicy inside is between red and yellow in color, and much darker than that of the tangerine, or other citrus fruit.

The Eagle Lake Nurseries have screened the tree and wrapped the screening in sheeting to a height of about 16 feet. It will be protected in every possible way from damage, and will be developed and refined by fertilization and other processes known to experienced citrus men, for about a year more, before it is used for budding for commercial purposes and put on the market. The variety will be known as the Elopine and it is believed by the buyers that when it reaches even a year's further development, its outer beauty and its inner quality will probably be unmatched in the citrus industry.

The tree promises to be a very strong grower and a vigorous bearer.

Negotiations for the tree began last October, and the deal has not yet been closed. It will probably be closed at an early date and the nurseries will continue their refining and perfecting processes for at least 12 months before putting the buds on the market. The Eagle Lake Nurseries have extensive holdings in Eagle Lake.

The tree has had very little attention, except that lavished upon it by the Boynton family, who took its excellence as a matter of course and paid it the compliment of using its fruit first, and to the limit, each season.

J. J. Hillman of Plant City, assistant auditor of the Florida Citrus Exchange, was in Dade City recently, going over the books of the Dade City Citrus Growers' association. He reports the conditions there with the local association as good as he found them elsewhere in the state.

Utilizing Tractors for Pumping Units

By H. O. Kay, U. S. Dep't of Agriculture

It is a generally conceded fact that the tractor is a necessary part of the equipment for a farm or grove, and as there are tractors of various sizes available, suitable for the various sizes of farms or groves, it remains only for the grower to decide whether or not he can afford to purchase that tractor suitable for his own particular needs. As a matter of fact, from the economic standpoint, no grower can afford to be without a tractor, as it enables him to do work often impossible with animals; to do heavier work with less wear and tear on the motive power; and to do his cultivation in a shorter period, thus giving him additional time to attend to matters of equal importance.

It is then a matter of demonstrating to the owner, or prospective purchaser of a tractor how he can utilize his tractor to the best advantage, and thereby realize the most on, and make him feel satisfied with, his investment. It has been estimated that the tractor is worked on an average of about 120 days a year for cultivation purposes, the remainder of the time lying idle, subject to rust and deterioration unless properly cared for, and unless given particular care in sheltering. This is of great moment in Florida. It is also estimated that the probable life of a tractor is about seven or eight years.

Before the advent of the tractor, it has been necessary to purchase special machinery to do power work on the farm, which machinery also remains idle for a certain period during the year, and often for a period of years. Then again, because of the high initial cost of a pumping plant, particularly the engine, having sufficient power capable of fulfilling the needs for irrigating the farm or grove, that necessary part of the equipment has often been omitted and the crops have suffered during protracted droughts. This oftentimes has resulted in a partial or even total loss to the grower. The tractor is making it possible to eliminate the engine furnishing such power (which very often is the most costly part of the equipment) and by this same substitution is increasing or lengthening the yearly working period of the tractor, and, by so doing, giving the grower greater returns for the money invested.

It is my purpose, therefore, to show the adaptability of the tractor for power on the farm, especially for the pumping unit, as applied for irrigation.

As stated before, there are tractors of various types and sizes suitable for the various sized farms, therefore it is first necessary for the grower to decide on the type of tractor and the amount of power needed for the proper cultivation of his tract. No one would consider purchasing a four h. p. tractor for cultivating a 20-acre farm or a 25 h. p. tractor for a five-acre farm, so that we can assume that a tractor having sufficient power has been, or will be obtained.

All tractors have, or can be fitted with attachments for supplying power either direct or by belt. The tractors, where already fitted, are rated at a certain power on the drawbar and a greater power on the belt; for instance, one tractor is rated at 15 h. p. on the drawbar and 25 h. p. for belt work, and is known as a 15-25 tractor. The larger or higher power tractors are fitted with pulleys for belt drive, so that the additional power on the belt is a decided advantage, as it gives ample power, even after taking into consideration the reduced efficiency of the engine unit because of the friction, stretching and slipping of the belt, for pumping when the pump is belt driven. This friction and slippage must be given more careful consideration when using the smaller and lower power tractors for between the losses in the engine and pump, the power transmitted is often reduced 50 per cent; and when recalling that the smaller tractors are only designed for from two to four h. p. on the belt, this means that the work actually performed by the pump may be only equal to one or two h. p. Some of this loss may be eliminated on the smaller tractors by directly connecting the small tractor to the pump with a flexible coupling connecting the engine shaft with the pump shaft. An agent for a certain small tractor states that he has directly connected his tractor and has obtained very satisfactory results. Another manufacturer states that it would be impractical to directly connect his tractor with the pump by means of a flexible coupling; this machine is now fitted with a pulley for belt work. Perhaps it would necessitate a lengthening of the shaft and a rearrangement of some of the minor parts of the machine, but the increased efficiency would more than repay the manufacturer who adopted this type.

Where the tractor is directly connected with the pump, a more stable foundation is necessary than when the pump is belt driven, and yet it is this same unstable foundation and liability of slipping of belt which tends to reduce the efficiency of an engine and pump. When speaking of direct connection, I am referring especially to connecting with centrifugal pump. This type of pump is the cheapest, both in first cost and in operation, and more effective under all irrigating conditions. This type can be obtained in any size and capacity; it is more steady in operation, returning less shock or strain to the motive power, thereby increasing the efficiency of the engine. I would recommend the direct connection only for the smaller 2-5 h. p. tractor, and when the tractor speed is rated near the pump speed necessary to meet the required condition.

The tractors on the market have attachments with which to regulate the speed, one by an electrical governor, others by a lever on the carburetor and others by adjusting the governor to regulate the speed, and as the pumps are also rated at a certain discharge when revolving at a certain speed, it is possible to regulate the speed of the engine and pump in order to utilize its power to the best advantage. Where the engine has only a single speed, by properly proportioning the engine and pump pulleys the required speed of a pump can be obtained.

After the grower has secured a tractor sufficient for his farming needs, the next consideration is whether or not it contains enough power for, and how to adapt it to, the pumping of a water supply adequate for his farm or grove. In order to know this, he must first know the requirements of a farm or grove, the quantity of water required and the best method of applying it. Knowing this, he can estimate the number of days his tractor can be used as a replacement for the engine. In order to estimate the need of irrigation, a study of the rainfall conditions that have prevailed in Florida and of the results of soil moisture tests in the grove is needed so that a

digression on that subject will be permissible, still keeping the general topic in mind.

Citrus fruits make their growth during the spring and summer months, during which time they must receive moisture regularly and not be permitted to become too dry. After irrigation is begun during the dry weather, the commonly accepted practice is to apply an inch of water every 10 days. This application produces the best results, so that, in order not to have the trees suffer from lack of moisture, without irrigation, we must have a rainfall somewhat irregular, supplying that amount which will be held by the earth as a reservoir and conserved for the trees. How often does such condition exist? In many places in Florida there is no plowing in the groves from November to the latter part of February. One of the reasons, and probably the principal one, why this is not done is that cultivating a grove in the winter months, particularly in January and the early part of February, tends to stimulate the trees, causing them to put out a new growth, which may be nipped by a later frost. By reason of this lack of the cultivation of the grove during the winter months, the ground is rather hard or crusty and from which the water will run off, instead of percolating into the ground, which would occur were the surface soft or mulched. This water which runs off is needed by the trees during the spring, for the new growth and to prevent the tree from wilting, causing the young fruit to drop.

A study of the rainfall records for Hypoluxo, Pensacola, Fort Myers and Orlando sections, representing all parts of Florida, shows that there are very few years when rain has fallen near the right amounts during the growing season. Perhaps the rains have been heavy and of short duration, which means a pelting, packing rain, resulting in most of the water running off on the surface—or the rains may have been light and soon evaporated by the wind and sun, of which there is plenty in this state.

From the data at hand, and a study of the rainfall record, it would seem fair to estimate that about half the years since 1890 are deficient in rainfall at the proper time, and so would make irrigation profitable. And yet the number of years when irrigation was necessary is not the main consideration, but how badly the trees needed the moisture and how much the growth of the trees was retarded, also what permanent injury the trees sustained and the financial loss to the grower.

It is not possible to determine the exact amount of moisture that must be present in the soil to keep the trees in good condition, as the citrus tree is very hardy and will not show wilt for a considerable time after the available moisture is exhausted. But there can be no doubt that the available supply is gone when the soil will run from the hand like dry sugar, which it does when the moisture supply has fallen below 8 per cent. (The percentage referred to is based on the ratio of the weight of the dried sample to the difference in weight between the wet and dried sample. In other words, it is the ratio of the weight of the water it contained, and is based on actual tests.) Then, too, upon the texture and structure of the soil depends the amount of water to be applied, for it is known that a clay soil is more retentive of moisture than sand. There are still other factors which are of importance in determining the need of, and method of irrigation; shallow, rooted crops, such as truck and small fruits will suffer from drought much sooner than deep-rooted trees in the grove. This difference in cropping also requires different methods, as trucking will require more frequent irrigation than is necessary for groves. A tree, with its larger and deeper root development, can draw from a larger area than truck plants, and does not depend so much upon the action of capallarity.

A study of the rainfall records, in conjunction with a study of the results of soil moisture tests in the grove, would lead one to the conclusion that there has been a need for irrigation during 10 of the past 20 years and that irrigation would have been beneficial to the crop and profitable to the grower. It is impossible to estimate the number of times when irrigation should have been practiced, but basing an estimate on the periods of drought, as shown by the rainfall records, and assuming that the plant and losses due to evaporation require an inch of water every 10 days—some plants requiring considerably more—a study of the rainfall charts would show that about four irrigations every other year would be about an average for groves. But more irrigation would be required for trucking.

However, the groves have been more neglected in this matter than crops in the sections where trucking is practiced, so that it is not a difficult matter for the trucker to recognize the value of irrigation, and the need for an irrigating plant.

The number of days required to irrigate a grove depends upon the amount of power used, the quantity of water pumped, the sizes of pipe for conveying the water and the method of distribution. But from observation of methods as practiced it would seem that from four to six acres would be a good average of what could be irrigated in a day. The prospective irrigator then can use these figures as a basis for determining the number of days a year required for irrigating as applied to this particular tract, and hence the number of days that the tractor can be used for pumping.

When the tractor is to be used as power for pumping, the same consideration must be given in determining the power required as would apply to a stationary engine used for the same work. First, determine the number of days to be consumed in irrigating. This will depend upon the size of the grove, the help available and the working period of the day. To irrigate the grove in a certain period requires a certain amount of water which, reduced to gallons per minute, will determine the size of pump required. Pumps are rated at a certain number of gallons per minute when it turns a certain number of revolutions per minute, or at which speed it has its greatest efficiency. This speed, and capacity, are marked on all pumps, having been tested in the factory. The speed of a tractor can be regulated on one by an electrical governor, in others by adjustment of the governor, and still others by a lever on the carburetor regulating the flow of fuel as the speed of an automobile is regulated. There are some, however, that have only one speed.

After ascertaining the speed of the driving pulley, it is but a simple matter to determine the size of pulley to be placed on the pump, in order to give to the pump its proper speed. For instance, if we have a driving pulley revolving at the speed of 2,000 feet per minute and the pump is to revolve at a speed of 800 revolutions per minute, by dividing the 2,000 feet per minute by the 800 we find that the driven pulley should have a circumference of two and one-half feet, which reduced to a pulley eight inches in diameter. Another method of proportioning is the diameter of a driver; diameter of driver or speed of tractor; speed of pump. When the speed of the tractor is high and can

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Uses of Agricultural Gypsum in 1920

By Dr. Frank A. Wilder

There is no story in agricultural science more fascinating than the history of agricultural gypsum. The work and the enthusiasm of Benjamin Franklin in connection with land plaster, as agricultural gypsum was generally called, are known to a great many people who know little else about agricultural chemistry. John Binn, Robert Livingston, Edward Ruffin and Judge Peters used land plaster and wrote quaintly of wonderful results that they secured. With very keen observation, however, they noted that the results were not always the same. Clovers, legumes and other crops invariably responded well to gypsum treatment, while certain other crops gave no increases. Edmund Ruffin, in his essay on calcareous manures in 1832, sums up the situation as follows:

"I do not pretend to explain the mode of operation by which gypsum produces its almost magic benefits; it would be equally hopeless and ridiculous for one having so little knowledge of successful practice to attempt an explanation in which so many good chemists and agriculturists, both scientific and practical, have failed. There is no operation in nature less understood or of which the cause or agent seems so wholly disproportioned to the effect as the enormous increase of vegetable growth from a very small quantity of gypsum in circumstances favorable to its action. All other known manures, whatever the nature of their action, require to be applied in quantities very far exceeding any bulk of crops expected from their use. But one bushel of gypsum, spread on an acre of land fit for its action, may add 20 times to its own weight to a single crop of clover."

The enthusiasm over agricultural gypsum continued into the middle of the last century, but waned steadily with the increase in the use of acid phosphate. It is only recently that the reason for these conditions has been determined. Farmers found that after application of gypsum for many years to the same ground, it no longer gave the large returns of earlier years and often gave no results at all. Acid phosphate, however, on these same soils and on other soils gave excellent results. Many an intelligent farmer has asked, "Why does not land plaster give me the same results that it gave in my father's time?"

Various answers have been given to this question, most of them very wide of the mark. The first step to a correct understanding of the behavior of agricultural gypsum dates back only a few years to the publication in 1911 of Hart and Peterson's investigations. In Wisconsin Bulletin No. 14 they called attention to the error of Wolff's analysis and proved conclusively that many important crops consume as much sulphur as phosphorus. Other investigators followed and proved that many soils are more deficient in sulphur than in phosphorus. Among these investigators were Brown and Kellogg in Iowa, Shedd in Kentucky, and Reimer in Oregon.

The result of Reimer's experiments, published in 1920, are of the greatest interest. In his test plots he used acid phosphate side by side with gypsum and secured equal or better results with gypsum at a small fraction of the cost. The soils that he tested had an ample supply of phosphorus but lacked gypsum, and the acid phosphate was beneficial only because it contained a small amount of gypsum produced incidentally by the reaction of sulphuric acid on the raw phosphate.

Right here it will be easy to stop and answer the question as to why the use of land plaster declined with the introduction of acid phosphate. Knowledge of mineral fertilizers was limited in those days and agricultural gypsum was used as though it were a complete fertilizer. Gradually the soil became amply supplied with sulphur, but deficient in phosphorus. The newly introduced acid phosphate gave the same sort of wonderful results under those circumstances that gypsum had given in earlier years. Moreover, since acid phosphate always contains some gypsum, the sulphur supply was also maintained so as to suffice for many crops.

It is interesting to note, however—and this is the real theme of this article—that for certain soils and certain crops the demand for gypsum has remained constant and insistent. In spite of persistent efforts to discourage its use, the grower of peanuts in Virginia and North Carolina insisted on having gypsum. He was urged to use lime instead, and he used lime and got benefit therefrom, but he also demanded gypsum, for when he used it he got the best results.

The explanation has been made relatively simple by Reimer's work. The peanut is a legume, and, like all legumes, is a heavy sulphur consumer. It seems to require even more sulphur than clover. Apparently the relatively small amounts of sulphur in acid phosphate are not sufficient to offset the deficiency in most soils of the coastal plain, and the need for the addition of more sulphur has been imperative. Consequently, the peanut grower, and particularly those who cultivate the Virginia or Jumbo variety, have insisted on having gypsum, claiming that they got empty shells or "pops" when the use of land plaster was neglected.

Each year has seen the peanut industry diversified and extended. Peanut butter is no longer a novelty, but a household necessity, and peanut oil for household use is rapidly assuming a position equally important. The kernel from which the oil has been extracted and even the hull have excellent value as stock food. Wherever agricultural gypsum has been used on peanuts most gratifying results have been obtained.

Shedd's experiments in Kentucky demonstrated that tobacco is another heavy sulphur consumer and field tests in several southern states show the use of agricultural gypsum with this crop is exceedingly profitable. In many instances where the soil was quite deficient in sulphur the results were almost magical.

In this connection a recent Washington dispatch is given and is of the greatest interest:

"What may prove to be a revolutionary development in the fertilizer industry of the world has been reached by the bureau of soils, United States department of agriculture, which has just solved the problem of extracting phosphoric acid from phosphate rock by heating mixtures of this mineral, sand and coke to a smelting temperature in a fuel-fed furnace. The new process has been worked out on an approximately commercial basis at the department's experimental plant at Arlington, Va.

"The phosphate used for fertilizer in the United States comes largely from the deposits of rock in Florida. There are also large deposits in Ten-

nessee and a number of beds in South Carolina, where the rock was first exploited for this purpose. The established method for producing soluble phosphate has consisted in treating the rock with sulphuric acid. In practice, a quantity of sulphuric acid equal to the quantity of rock is used and the resulting product, which is known as acid phosphate, contains only one-half the percentage of phosphoric acid contained in the rock from which it was derived. Commercial acid phosphate, for instance, made from a 32 per cent rock contains only 16 per cent of phosphoric acid. The elaborate washing and screening process now used in preparing phosphate rock from treatment with sulphuric acid often results in the loss of two-thirds of the rock, and it was with a view of saving this immense waste of phosphate that the new process was evolved.

"The United States department of agriculture has been experimenting for some time along the lines of freeing the phosphoric acid by means of a high degree of heat. It was the first to adapt the Cottrell precipitator to the collection of phosphoric acid, the appartus having been previously devised by Dr. Cottrell to abate the smoke nuisance and to recover sulphuric acid from smelting operations.

"The department turned its attention to the possibilities of using crude oil, the cheapest fuel obtainable in the vicinity of the large phosphate rock deposits of Florida. The efforts have recently met with success and figures kept on the experimental runs at Arlington indicate that phosphoric acid can be extracted more cheaply in an oil-burning furnace than by the old sulphuric acid process.

"The practical value of the new development is indicated by the fact that in the experimental runs at Arlington the department chemists were able to recover a 64 per cent phosphoric acid (47 per cent P205), as against the 16 per cent product ordinarily obtained by the sulphuric acid process. By passing ammonia gas into this phosphoric acid, solid ammonium phosphate, a very concentrated material containing two valuable fertilizer ingredients results. This material can stand heavy transportation and handling charges. It is also practicable to mix the phosphoric acid with phosphate rock in such proportions as to give a product containing 50 per cent of soluble phosphoric acid. This product is similar in its properties to ordinary 16 per cent acid phosphate. It will permit a material saving in freight to central plants where the product may be diluted or mixed with other ingredients for shorter hauls. The difference between a 50 per cent product and a 16 per cent product means an immense saving in the freight charges and the release of large quantities of rolling stock and vessel tonnage now engaged in the transportation of phosphate and phosphate rock.

"While the actual cost of the new process in a large industrial plant is difficult to estimate with accuracy, in the work thus far done, even on a small scale, it was found that the fuel consumption was only about 15 per cent of the value of the product, while in the sulphuric acid process the cost of the acid used seldom runs below 22 per cent. This factor, together with the reduction of freight charges, justifies the assumption that the new process will be of the utmost importance to the fertilizer industry."

The field for agricultural gypsum is very great even under existing conditions, for rock phosphate when finely ground is fairly soluble and its use is extensive, but it needs agricultural gypsum to supplement it and supply the sulphur. If, however, the process of rendering phosphate rock as soluble as acid phosphate by heat, as described in the Washington dispatch, is practical, it will open an immense field for agricultural gypsum, for it will displace acid phosphate. As soluble phosphate made by this process will lack sulphur, this deficiency can best be met by adding agricultural gypsum.

ANOTHER CITRUS BY-PRODUCT CONCERN

Another new concern for the manufacture of citrus by-products has been established in Tampa under the name of the Peninsular Fruit Products company. This concern is putting out a complete line of citrus products under the "Bit-O-Sweet" brand.

In addition to the manufacture of marmalades, jellies, crystallized peel, etc., this concern is extracting the essential oils from orange and grapefruit peel to be used as flavored for cakes and jellies. It is the aim of this company to utilize all citrus by-products, and they contemplate soon adding equipment for utilizing the seeds in the manufacture of soaps and lye and also as a fertilizer by utilizing the ammonia content.

Citrus drinks and juices, fruit ices and other products are being placed on the market by this concern, which not only utilizes the drops and culls, but also much of the finer grades as well.

In speaking of the field for the manufacture of citrus by-products, a member of the company says:

"There is absolutely no possibility of overdoing the matter. There is room in Florida for every concern of this kind now in business and for scores more yet to be organized. This phase of the industry is just in its infancy, and for many years the demand is certain to be far in excess of the supply of manufactured products. This feature should be expanded until every waste fruit in the state is utilized."

GRECIAN CITRONS IN BRINE COMING TO AMERICAN MARKETS

American purchasers of citrus fruits will be interested in learning that the 1920-21 citrus crop in the consular district of Patras, Greece, is reported to show an increase of 20 per cent in production and an increase of approximately 30 per cent in prices. The American consul at Patras says that this price increase ranged from 25 per cent on low-grade fruit to 40 per cent on the best grade. American buyers last year imported 1,007,686 pounds of citrons in brine from Patras.

Local citrus export firms state that the demands already in hand assure a considerable increase in American business. The principal reason given for increased prices is the heavy cost for cutting, brining and barreling. This cost has jumped from 61 cents per 100 pounds to $1.29, because of higher wages and increased costs of cooperage expenses.

The citrus region is confined to the provinces of Vostizza, Agrinion, Diakopton and Akratas. The first two produce most of the finer fruit exported to the United States. There was no fly damage, but heavy frosts in early November wrought losses amounting to 40 per cent of the crop. Curiously enough, the lemon and orange crops of western Greece escaped all frost damage, but suffered a general loss of 45 per cent from fly damage.

NO OUTBREAK OF CITRUS CANKER

According to a statement made by Dr. Wilmon Newell, Plant Commissioner for the State Plant Board, there is no foundation for the rumors that "several" outbreaks of citrus canker have recently occurred in Palm Beach county.

Spraying Hints for the Uninitiated

By County Agent K. E. Bragdon

County Agent K. E. Bragdon gives valuable information to the beginner in spraying. For whitefly and scale insects the main object is the complete wetting of both sides of every leaf and all of the trunks and branches.

Good pressure is necessary. The amount of pressure depends upon the size of the nozzle and the agility of the man handling it. A rapid worker can handle 250 pounds pressure; a slow man will not handle more than 150 pounds. Moral—get rid of the slow man. A barrel pump operated by hand will not maintain more than 80 to 100 pounds. Moral—eliminate the hand pump. A power pump of at least 175 pounds pressure should be used.

The amount of spraying material needed to thoroughly cover a tree varies with the size of the tree. A very young tree will not require over half a gallon, while an extra large tree will take 15 gallons. The average tree of 10 to 12 feet requires about eight gallons.

Spraying should never be done during a rain or when the foliage is dripping wet. Spraying should cease at least 10 minutes before a shower and not resumed until dripping of the leaves has stopped.

An extensive spraying outfit and costly materials should not be turned over to men who know nothing or care nothing about thoroughness in their work or the proper manner in which to handle a valuable and delicate machine.

Oil sprays should be mixed with soft water or water that has been softened.

Spraying should be done for a reason and not on the hit or miss plan. The best manner in which to judge proper time for spraying is to watch the trees, know the different pests to be guarded against and by the use of a good hand lens be able to tell the approximate moment when spraying will be most effective and economical. Some people spray periodically, regardless of the presence of insects in large or small numbers, or not at all. This method will control the pests if done often enough, but will generally prove expensive. Others spray after the insects have become so numerous that the damage has been done. This is too late. There is still another class who will not spray for any reason whatsoever. Sometimes this class of individuals is harder to control than any insect pest we have.

Spraying in the right manner, with the correct pressure, at the proper time, with suitable materials, will give satisfactory results. Any other kind of spraying will give almost any other kind of results.

Tangelo Tree Attracts Attention.

By W. B. Powell in Lakeconics

More than 10 years ago Hon. Walter Swingle, head of the United States plant board, Washington, sent to Mr. J. P. Donnelly, of Mt. Dora, a cutting from a tree he had propagated, a cross between a tangerine and a pomelo. Recently Mr. William Watt forwarded to Mr. Swingle a box of tangelos.

In the meantime, the tangelo tree on Mr. Watt's place is attracting much attention. Mr. Donnelly gave the cutting to Mr. Watt and he has tenderly nursed the stock to which he grafted the cutting, and today the tangelo is a large, sturdy tree, bearing probably 10 boxes of the most delicious fruit that man ever tasted.

The fruit is about the size of a large navel orange, with a smooth texture. It peels like a tangerine. The fruit is heavy with juice, practically seedless, and with enough grapefruit flavor to just counteract the sweetness of the tangerine.

Mr. Watt has grafted 250 sour stock to the tangelo wood and intends to increase his tangelo acreage from now on. He finds a ready market for all his fruit at $9 a box on the tree. Lewis N. Wiggins, of the Ocklawaha hotel, took a box to his hotel at Eustis, and the guests were so delighted with the morning appetizer which they could eat in segments, or sliced, thus doing away with the "squirt" of a refractory grapefruit under the pressure of a spoon, that he immediately asked Mr. Watts to sell him all the fruit on the tree. This Mr. Watts refused to do, as he takes considerable pride in the tree and its product and delights in letting his friends taste thereof.

Discussing the possibilities of this fruit, we learned that two other varieties of citrus fruit will soon be on the market in a small way as a test of its marketing and sale values. One is a limequat propagated at Eustis by Mr. Savage, and the other an orange that will be dead ripe for the Thanksgiving trade, and the man who burbanked this wonder asked your reporter not to mention his name, for his time is taken up with so many other things that he cannot answer correspondence that this information would create. An early Florida orange would be a world-beater, and would do much to put a check on the green fruit shipments each fall.

THRIPS IN CITRUS BLOOMS

Trees are now in bloom over the entire citrus section of the state. Now is the time to combat one of the serious pests of oranges and other related fruits, says Professor J. R. Watson, entomologist of the Florida Experiment Station. If there are many thrips on and about the blooms spray them now. The following spraying solution is recommended:

Commercial lime-sulphur solution (32 degrees baume), 3 quarts.

Black leaf 40, ½ pint.

Water, 50 gallons.

In applying drive the spray straight into the blooms with considerable force. It should be applied just as the petals are beginning to fall freely.

Thrips are small yellowish-brown insects about a twenty-fifth inch in length. It feeds on the petals and other tender parts of the flower, which causes much of the bloom to drop without setting fruit. Eggs are laid in the tender stem at the base of the fruit and the young thrips, which hatch out from these eggs in three or four days, feed upon the developing fruit and cause smooth, irregular-shaped, sunken spots in the skin. These spots mar the appearance of the fruit and lower its grade.

UTILIZING TRACTORS FOR PUMPING UNITS

(Continued from Page 16)

be regulated and the pulleys are already in place, by using a speed indicator it is possible to reduce the speed of the tractor until the pump is turning at its most efficient speed. The speed of the pump can be regulated by changing either pulley. Where the small tractor is direct connected it is essential that the speed be adjustable to conform with the optimum pump speed. That is one of the reasons why it is necessary to have a solid foundation when direct connected; another is so that the machine can be placed in exactly the same position each time and fastened securely by quick attaching methods to the pump. Where the pump is belt driven, blocking must be placed, keeping the tractor at a fixed distance from the pump, in order to keep the required tension of the belt.

In setting up the tractor for driving the pump, care should be taken to have a proper alignment, otherwise the belt may be continually slipping off or wear unduly on one side. Spacing the tractor from the pump depends to a great extent, on the sizes of pulleys used and the horsepower of the tractor. One well-known pump company makes it a practice to figure eight-foot centers on engines and pumps where the power does not exceed 6 h. p. and when the pulleys or pump and engine are small and of approximately the same size.

Where the pulley or the engine is much larger than are the pumps, a good rule is to add the diameter of the two pulleys together and multiply by three to get the distance between the engine and pump shaft. On outfits of 10 h. p. and larger, 10 feet is the minimum spacing, depending upon the size of the pulley. However, the main object to be obtained in spacing is to have the belt come in contact with as near half the pulley surface as possible.

Where the engine and pump are spaced about 10 feet apart, the sag of the return side of the belt should be about one or one and one-half inches and greater as the distance between machines is increased. Should an idler be required, it will work most satisfactorily when placed one-fourth of the way from the driving pulley. A leather belt will stretch 6 per cent of its length, so this must be watched and adjusted for an efficient working of unit width of belt. The belt should not be too tight, otherwise trouble will follow by the belt working off, friction will be increased, and bearing will overheat and burn out.

As to the comparative cost of operation between where the tractor is used for the pumping unit and where a stationary engine of smaller power would be sufficient, most of the tractors on the market are designed for and will burn either gasoline, kerosene or even distillate, while stationary engines of six h. p. or less require gasoline in order to produce the best results.

KEEPING QUALITY OF FLORIDA ORANGES

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are caused and how they may be eliminated.

At the time the department investigations were started the methods of handling Florida citrus fruits for shipment were extremely crude. Growers did their own picking, there was no uniformity of system, and the work was performed only indifferently well. These statements are not meant to reflect in any way upon the standing of the industry or to criticize the individuals who were concerned with the preparation of the fruit for market. Practically all of the imperfections were due to a lack of knowledge on the part of the growers and shippers and not to their desire to slight any of the important work. No one realized the effects of injury to the fruit, and few, if any, believed that injury was being inflicted. Growers and packers frequently greeted the department workers with the statement that practically no injury was being done to their fruit, whereas later examination often showed 15 or 20 per cent of their oranges to be injured in some way. The scattered nature of the industry was largely responsible for the crudeness with which the work was carried on. The old neighborhood competition in the production of high-grade, attractive fruit disappeared after the freeze, when the plantings were distributed so widely over central and southern Florida. Groves were more or less isolated, and a grower was frequently wholly ignorant of the type of work being done by other producers of citrus fruits.

When the department investigations were begun it seemed almost hopeless to expect that the results of the work could be made effective. The importance of getting in touch with every grower and shipper was realized from the start, yet without some central organization through which these individuals could be reached it seemed impossible to expect that improvements in the methods of handling could be inaugurated.

The changes which have taken place in Florida during the past five years are truly remarkable. The old type of packing house has almost entirely disappeared. Modern houses, equipped with the newest machinery for handling fruit properly, have been constructed in practically every citrus district in the state, so that at the present time the industry is particularly well provided with the mechanical appliances for doing good work. The attitude of the growers and packers has changed more slowly, however. The department has conducted a large number of field demonstrations in order to educate pickers to the necessity of careful work, and although much has been accomplished in this line, much still remains to be done. The introduction of better handling methods is largely a business problem. It has to do with the reorganization of the forces of workmen and with the method of paying them rather than with the discovery of the cause of a particular form of decay.

In California the occurrence of injury in preparing the fruit for shipment was associated with the way in which the work was done. The pickers were paid by the box, and naturally each man was ambitious to pick as many boxes as possible during the day, irrespective of the character of his work. A premium was thus placed on rough handling. Several large companies, employing hundreds of men, demonstrated that by changing from the box-payment to the day-payment plan and by insisting upon careful work they could practically eliminate all picking injuries. A change in the plan of payment is not, in itself, sufficient to bring about better work, however; the workmen must be properly organized and supervised, and each individual picker must be held responsible for the character of his work. In California a change from the individual grower doing his own picking to the plan of association picking crews resulted in very great improvement in the character of the work. The same plan has more recently been carried out in Florida with very beneficial results.

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